

# **Information Technology as the Change Agent for Transformation**

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From May 31 through June 1, 2001, the U.S. Army War College; the U.S. Army Director of Information Systems for Command, Control, Communications and Computers (DISC4); the U.S. Army Space and Missile Defense Command and the Association of the United States Army cosponsored a symposium at Long Beach, CA, to discuss information technology (IT) as a change agent for Army and Defense transformation. The 115 attendees came primarily from industry, but the military and other government entities with vital interests in IT were also well represented. Not surprisingly for such a group, one of the strongest messages from the symposium was that IT possesses great promise. Some speakers also covered the vulnerabilities of dependence on this as yet unrealized potential. Finally, particular mention was made of the significant technological and cultural obstacles yet to be overcome.

## **Information Technology Promise and Vulnerabilities.**

Although there was dissent, the majority view was that information technology is key to command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) and that C4ISR is key to Army and Defense transformation. Less generally accepted, but with strong advocates, was the position that space is key to information technology. IT's great expense was recognized, but rationalized by the promise of significant return on investment. If the return is realized, it will enable savings in other areas of industry, the government, and the military.

However, IT can provide too much information, and soldiers and commanders in the field are already at risk of being inundated with data that they must sort, prioritize, and analyze. Further, commanders at all levels may also use that information--and the direct communications links that IT also enables--to micromanage situations across the spectrum of military operations.

Despite reservations about employment of IT, it is fairly easy to accept its criticality to transformation. That does not mean that it doesn't have vulnerabilities. IT systems are still fragile and can break down at the most inopportune times. The complexity of the systems can make users mistrust them or operate them at far less than full capacity. Perhaps IT's greatest vulnerability is its criticality. A failure in the C4ISR system exposes the Future Combat System and the Objective Force to defeat in detail. Hostile forces will likely concentrate on breaking the IT link, believing that catastrophe will result. The difficulty of attacking IT nodes, particularly in space, cannot be overstated, but even the best of

systems has weak points that an enemy can exploit. The same technological leaps that will be required to realize the promise of IT are also possible in the "anti-IT" world. As one speaker noted, though, it is too expensive to do more than rudimentary planning for major IT failure. Space-based systems are hugely expensive; putting multiple systems into the constellation is usually prohibitive. The same is true of fielding redundant systems to provide backup capability. Significant expense is also involved in developing and maintaining forces that can take full advantage of IT data, but can also operate effectively across the spectrum of conflict when IT fails.

### **Technological Challenges.**

Major problems exist regarding power requirements. Many capable IT systems take inordinate amounts of power to operate, especially if they are to have the desired range to reach across strategic distances. The weight of batteries and generators continues to put too much load on soldiers and their vehicles. Additionally, the frequency signature generated by IT operations too often provides a beacon for opposing forces to use as a target.

Perhaps the most widely acknowledged challenge is insufficient bandwidth. In power, weight, signature and bandwidth, promises of technological solutions are being made on a regular basis and technological advances frequently follow, some of them delivering exponential increases in capabilities. However, some proposals appear to conflict with immutable laws of physics. In these cases, some procedural workarounds are proving feasible. Simply deciding which key systems need large amounts of data can decrease demands on bandwidth. Not everyone requires real-time streaming video to accomplish his or her mission.

Technological integration of data is another important area receiving great emphasis in IT labs throughout industry. Some system needs to take the huge amount of data being generated and turn it into a usable form. More than one speaker commented on the need for knowledge, not just information. Situational understanding, not mere situational awareness, is the true goal. The former is useful as knowledge; the latter is simply information that is not "actionable." Technological gaps remain, but obstacles thought insurmountable a decade ago are regularly scaled today. It is best not to depend too heavily on a string of miracles for successful development of a key piece of IT, but it is also somewhat foolhardy to believe that breakthroughs will never occur.

Although system design could perhaps be tagged as something other than a technological issue, it remains a major challenge. Designers and producers tend to defend their systems' shortcomings by blaming users who don't operate them properly or use their outputs correctly. Too many users are uncomfortable with the systems they are required to operate. When this occurs, they either find workarounds or distrust the output. The mechanic who prints out a technical manual rather than using an electronic version is chided for not stepping into the digital age. Refusing to allow the mechanic access to a printer is not the answer; the answer instead is a digital manual that gives him the same utility that he gets from the paper version. Commanders continue to see digital

data on enemy dispositions, but fail to act on the data until confirmed by more traditional assets. A voice report from a scout with "eyes on" a target seems more reliable than an electronic feed from satellites or other remote sensors.

### **Cultural Challenges.**

One of the few points of broad consensus was that the human dimension is the greatest obstacle to realizing IT's potential. Keynote speaker Lieutenant General Peter Cuvillo (DISC4) acknowledged that the vision of a network-centric, knowledge-based Army depends upon a major culture change, a rejection of the "not invented here" syndrome, and development of an attitude that no longer demands a "man in the loop." Technological solutions can be found to reduce some of the resistance to change, but the human-machine interface still deserves greater attention.

Too much IT potential is squandered in stovepipe processes, originating within individual Services and focusing on a narrow answer to a particular question. Each Service has its own proponents for specific types of warfare. Different parts of the Air Force fight for differing degrees of emphasis on fighters, bombers, missiles, and space; the Navy works to balance aviation, submarines, and surface ships; and the Army must decide among competing demands for its infantry, armor, and aviation forces, to name just a few. The challenge grows exponentially at the joint level, then again at the interagency and coalition level. Horizontal funding offers a possible solution to the influence of vertical stovepipes. The Army tries to do horizontal integration while building the Program Objective Memorandum (POM) using its Program Evaluation Group (PEG) process. The sheer breadth of topics covered in that process makes it impossible to attain much more than a modicum of horizontal integration. Much work remains to be done in this critical area.

Another cultural change required involves the cumbersome process used to develop and procure new equipment. With the rapid rate of IT change, a process that takes years to produce new equipment will field obsolescent products. Commercial off-the-shelf equipment must be quickly evaluated, procured, and fielded, perhaps to be modified significantly or replaced long before the end of its planned life cycle. The military lacks the profit motivation of industry and the financial flexibility to remain abreast of new technology. Military procurement systems must change to accommodate the simple fact that the market place is driving the spread of technology, with consequent and welcome reductions in cost, but making it increasingly difficult to obtain and retain a technological edge.

### **Conclusion.**

Other obstacles must be overcome if IT is to achieve its promise. Training soldiers and units on Legacy, Interim, and Objective Force equipment will be demanding enough; the requirement to "re-do" the training as technology is fielded more rapidly increases the problem. IT may help through virtual and constructive simulation, but those proposed

solutions are expensive, are still on the drawing board, and face the same constraints of the laws of physics. Solving the technical training problem may be the easiest part; there will be an added burden on the education system that teaches and develops doctrine. Logistics and personnel systems will face similar difficulties, though IT again offers possible solutions in the form of more effective database management. Integration of the Reserve Components contributes to the complexity of each concern (training, logistics, personnel), but must be accomplished to ensure inter-operability. However, none of the impediments diminish the spectacular advances in information technology or its great potential. If the promise of information technology can be fully realized--and the major vulnerabilities eliminated--the resulting force will be one capable of achieving optimum levels of effectiveness and efficiency in any situation faced by the Army for many years.

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